

Table 3.1.6-14 presents the v/c ratios for peak hours of the existing year (2009) in the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **0.45 to 1.06** and **0.38 to 1.04** during the PM peak hour (shown in bold in the table).

A more-detailed link-by-link presentation of the existing freeway mainline LOS under 2009 traffic conditions for GP and HOV lanes is included in Appendix L2.

### **Freeway Connector Volumes**

Table 3.1.6-15 provides the existing branch connector volumes on ramps within the I-405/I-605/SR-22/7<sup>th</sup> Street interchange not presented under the Orange County heading in Section 3.1.6.2, Affected Environment. Branch connectors are the ramps connecting one freeway to another. The freeway-to-freeway branch connectors are currently operating under capacity during both AM and PM peak hours. Branch connectors operate with v/c ratios ranging from **0.31 to 0.81** under existing conditions (shown in bold in the table).

### **Arterials, Intersections, and Interchanges**

To establish existing (year 2009) traffic conditions for arterial and interchange study locations, AM and PM peak-hour turning movement counts were collected. Existing (year 2009) AM and PM peak-hour traffic volumes for arterial and interchange study locations within the study area in Los Angeles County are illustrated in Figure 3.1.6-9. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for existing conditions is provided in Table 3.1.6-12 for all of the study intersections. The study intersections are currently operating at LOS D or better, except for 10 intersections that are operating at LOS E or F during either the AM or PM peak hour or both (shown in bold in the table). Table 3.1.6-12 also shows that study intersections are currently operating under capacity (i.e., v/c less than 1.00) during peak hours, except for three intersections that are currently operating over capacity.

A comparison of existing vehicle queuing (higher of AM or PM peak-hour 95<sup>th</sup> percentile queues) with available storage (in feet) was conducted at all arterial interchange study intersections and is summarized in Table 3.1.6-16. The table shows that all off-ramps with traffic control at their arterial intersections have adequate turning lane storage under existing conditions. Table 3.1.6-16 also shows that 82 percent of arterials have adequate turning lane storage at ramp intersections and 54 percent of turning lanes at arterial/arterial intersections have adequate storage.

### 3.1.6.3 Environmental Consequences

#### ***Permanent Impacts***

Year 2020 is the year in which the proposed project is scheduled to be open to traffic if one of the build alternatives is implemented. Year 2040 is the design horizon for the proposed project build alternatives. Therefore, traffic analyses were conducted for the following eight future conditions:

Opening Year No Build Traffic Conditions – Year 2020

Opening Year Alternative 1 Traffic Conditions – Year 2020

Opening Year Alternative 2 Traffic Conditions – Year 2020

Opening Year Alternative 3 Traffic Conditions – Year 2020

Design Year No Build Traffic Conditions – Year 2040

Design Year Alternative 1 Traffic Conditions – Year 2040

Design Year Alternative 2 Traffic Conditions – Year 2040

Design Year Alternative 3 Traffic Conditions – Year 2040

The four alternatives are generally described as follows:

No Build Alternative. The No Build Alternative would provide no additional lanes or interchange improvements to the I-405 corridor. The project area would continue to operate with no additional improvements except for the following two projects, which are assumed to be completed under all future conditions.

1. The SR-22 WCC Project from SR-22 East to I-605 will add a second HOV lane in each direction and HOV direct connectors between I-605 and I-405 to/from the south and also between SR-22 East and I-405 to/from the north.
2. Continuous access HOV lanes along I-405 throughout the area in which improvements are proposed.

Alternative 1. This alternative would add a single GP lane in each direction of I-405 from Euclid Street to the I-605 interchange.

Alternative 2. This alternative would add one GP lane in each direction of I-405 from Euclid Street to the I-605 interchange (as in Alternative 1), plus add a second GP lane in the northbound direction from Brookhurst Street to the SR-22/7<sup>th</sup> Street interchange and a second GP lane in the southbound direction from the Seal Beach Boulevard on-ramp to Brookhurst Street.



Table 3.1.6-14: Mainline HOV Volume-to-Capacity Ratio for Year 2020 – Locations in Los Angeles County

Segment	Direction	Existing 2009		No Build 2020*		Alternative 1 2020*		Alternative 2 2020*		Alternative 3 2020*	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
I-405 HOV I-605 to Studebaker Road	NB	0.84	0.87	<b>1.35</b>	<b>1.51</b>	<b>1.30</b>	1.08	<b>1.24</b>	<b>1.46</b>	<b>1.12</b>	<b>1.24</b>
	SB	0.50	0.95	1.16	1.11	1.21	1.09	1.19	1.09	0.96	1.06
I-405 HOV Studebaker Road to Lakewood Boulevard	NB	<b>1.06</b>	0.74	<b>1.01</b>	1.18	1.12	1.11	1.11	1.26	1.01	1.11
	SB	0.50	<b>1.04</b>	1.16	1.12	1.21	1.16	1.19	1.09	0.94	1.15
I-605 HOV I-405 to Carson Street	NB	<b>0.45</b>	<b>0.38</b>	<b>1.01</b>	1.32	<b>1.00</b>	<b>1.31</b>	<b>1.00</b>	1.32	0.99	1.01
	SB	0.63	0.43	1.16	<b>0.99</b>	1.19	<b>1.02</b>	1.21	<b>1.08</b>	<b>0.81</b>	<b>0.76</b>

NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound; V/C – Volume-to-Capacity Ratio  
Bolded V/C and D/C (demand volume-to-capacity) ratios indicate the minimum and maximum values as discussed in the text.  
\* – For future conditions, the D/C ratio is used instead of the V/C ratio.

Table 3.1.6-15: 2020 Branch Connector Volumes and Volume-to-Capacity Ratios – Locations in Los Angeles County

Branch Connector	Existing 2009				No Build – 2020*				Alternative 1 – 2020*				Alternative 2 – 2020*				Alternative 3 – 2020*			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	Volume	V/C	Volume	V/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C
I-605 SB to I-405 NB	848	0.47	1,096	0.61	920	0.51	1,120	0.62	800	0.44	1,000	0.56	790	0.44	960	0.53	790	0.44	1,000	0.56
I-605 SB/7 <sup>th</sup> Street to I-405 NB	1,555	0.43	1,864	0.52	1,680	0.47	1,620	0.45	1,550	0.43	1,480	0.41	1,500	0.42	1,440	0.40	1,460	0.41	1,430	0.40
I-405 SB to I-605 NB	1,376	0.38	1,305	0.36	1,400	0.39	1,260	0.35	1,290	0.36	1,060	0.29	1,250	0.35	980	0.27	1,310	0.36	1,130	0.31
I-605 SB/I-405 SB to 7 <sup>th</sup> Street	1,460	<b>0.81</b>	622	0.35	2,040	<b>1.13</b>	1,360	0.76	2,150	<b>1.19</b>	1,120	0.62	2,050	<b>1.14</b>	1,040	0.58	2,020	<b>1.12</b>	1,930	1.07
7 <sup>th</sup> Street to I-605 NB/ I-405 NB	1,100	<b>0.31</b>	1,300	0.36	1,210	0.34	1,330	0.37	1,120	0.31	1,230	0.34	1,060	0.29	1,230	0.34	1,340	0.37	1,170	0.33
7 <sup>th</sup> Street to I-405 NB	707	0.39	768	0.43	770	0.43	440	<b>0.24</b>	750	0.42	430	<b>0.24</b>	720	0.40	420	<b>0.23</b>	720	0.40	430	<b>0.24</b>

V/C – Volume-to-Capacity Ratio based on branch connector capacity of 1,800 vehicles per lane for GP branch connector lanes.  
D/C – Demand Volume-to-Capacity Ratio based on branch connector capacity of 1,800 vehicles per lane for GP branch connector lanes.  
Bolded V/C and D/C ratios indicate the minimum and maximum values as discussed in the text.  
\* – For future conditions, the D/C ratio is used instead of the V/C ratio.

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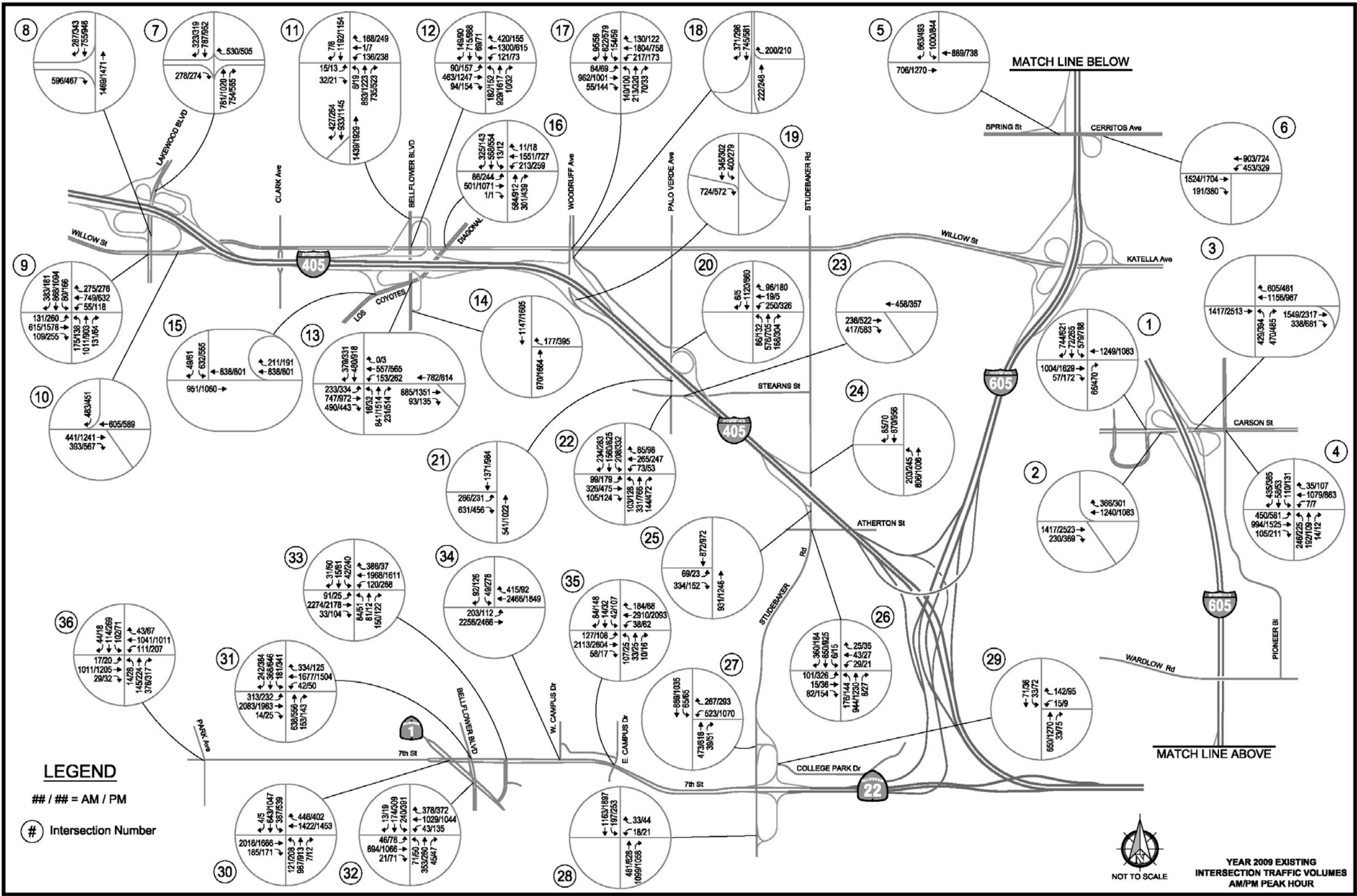


Figure 3.1.6-9: Existing (2009) Intersection Traffic Volumes for AM/PM Peak Hour – Locations in Los Angeles County

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Table 3.1.6-16: Number of Locations with Adequate Vehicle Storage<sup>1</sup> in 2009 and 2040 – Locations in Los Angeles County

Location	Existing 2009			No Build – 2040			Alternative 1 – 2040			Alternative 2 – 2040			Alternative 3 – 2040		
	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage
Off-Ramp at Arterials	10	10	100	9	10	90	9	10	90	9	10	90	10	10	100
Arterials at Ramps	9	11	82	7	11	64	8	11	73	7	11	64	8	11	73
Arterial/Arterial Intersections	35	65	54	29	65	45	29	65	45	32	65	49	33	65	51

<sup>1</sup> Storage is considered adequate if it will contain the 95th percentile queue.

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Alternative 3. This alternative would add one GP lane in each direction of I-405 from Euclid Street to the I-605 interchange (as in Alternatives 1 and 2), plus add a tolled Express Lane in each direction of I-405 from SR-73 to SR-22 East. The tolled Express Lane and the existing HOV lanes would be managed jointly as an Express Facility with two lanes in each direction from SR-73 to I-605.

The objective is to open the tolled Express Lanes with a HOV2+ occupancy free to encourage rideshare and transit usage. Operational adjustments to the tolled Express Lanes may be implemented based on demand, rates of speed, traffic volumes, and to meet financial covenants, maintenance and operational obligations. Potential operational adjustments include, but are not limited to:

- adjusting to HOV3+ free with HOV2s discounted tolls
- adjusting to HOV3+ free with HOV2s full tolls
- adjusting to tolling HOV2s on individual tolling segments such as direct connectors to or from other freeways
- periodic adjustments of tolling rates to maintain operations on individual tolling segments

All of the build alternatives (i.e., Alternatives 1, 2, and 3) would also add auxiliary lanes at appropriate locations; provide improved left and right shoulders; include improvements to local street overcrossings and bridges; provide the TSM and TDM measures included in Section 2.2.2.1, Common Design Features of the Build Alternatives; include improvements at most of the interchanges, including additional off-ramp vehicle queue storage and on-ramp, and connector metering storage; and provide improvements at selected nearby arterial street intersections affecting interchange operations. A summary of major improvements at each interchange is presented below. A complete listing of improvements at each interchange is provided in the Traffic Study.

### **Orange County**

Fairview Road Interchange. At the Fairview Road interchange, the project would move the ramp meter west of the three-lane section of the ramp and modify the I-405 northbound off-ramp at South Coast Drive to provide off-ramp queue storage of 180 ft.

Harbor Boulevard Interchange. At the Harbor Boulevard interchange, the project would modify the I-405 southbound on-ramp from northbound Harbor Boulevard to provide more queue storage and modify the median on Harbor Boulevard south of Gisler Avenue to provide queue storage of approximately 220 ft for the northbound left-turn movement at the Harbor Boulevard/Gisler Avenue intersection.

Euclid Street and Ellis Avenue Interchange. At the Euclid Street and Ellis Avenue interchange, the project would add a new ramp from eastbound Ellis Avenue to the southbound I-405, eliminating the dual left-turn lanes from eastbound Ellis Avenue to the existing I-405 southbound on-ramp. The project would improve the I-405 southbound and northbound off-ramps to provide increased queue storage and make improvements to Euclid Street and Ellis Avenue in the vicinity of their intersection with the I-405 ramps.

Brookhurst Street and Talbert Avenue Interchange. At the Brookhurst Street and Talbert Avenue interchange, the project would replace the existing cloverleaf interchange at Brookhurst Street with a partial-cloverleaf interchange design, eliminating the loop off-ramps and the northbound and southbound Collector-Distributor (C-D) roads. The remaining ramps would be widened at their arterial end for additional storage and turn lanes.

Magnolia Street and Warner Avenue Interchange. In the Draft EIR/EIS at the Magnolia Street and Warner Avenue interchange, replacement of the northbound C-D road with braided ramps was proposed along with braided ramps in the southbound direction to replace the southbound on-ramp from Magnolia Street and off-ramp to Warner Avenue. In response to comments received on the proposed braided ramps, two separate design options (one in each direction) were considered that would not include braided ramps. In the southbound direction, an auxiliary lane would be provided from the Magnolia Street on-ramp, past the Warner Avenue on-ramp, and terminating upstream of the Warner Avenue on-ramp. In the northbound direction, the braided ramps would be replaced with a C-D road. Both design options are included in the Preferred Alternative.

### **Design Options Included in all Build Alternatives**

All Build Alternatives include two design options: one with no braided ramps in the southbound direction at the Magnolia Street and Warner Avenue interchanges and the other with no braided ramps in the northbound direction at the Magnolia Street and Warner Avenue interchanges.

*No Braided Ramps Southbound at the Magnolia/Warner Interchange.* The design option that has no braided ramps in the southbound direction at the Magnolia Street and Warner Avenue interchanges could affect the configuration of the proposed interchange improvements at the intersection of Magnolia Street and the southbound I-405 ramps. The design option that has no braided ramps in the southbound direction has substantially less ramp meter storage on the southbound I-405 on-ramp from Magnolia Street than the design with the braided ramps. Although the design option without the braided ramps is anticipated to have sufficient storage to contain queues within the ramp (see Traffic Study, Table 3.8.6), if the storage is found to be insufficient the southbound approach of Magnolia Street to the southbound I-405 ramps could be restriped to provide two exclusive through lanes and one exclusive right-turn lane into the ramp;



the exclusive right-turn lane would effectively provide additional ramp storage. LOS at the intersection would be the same or better at the intersection than under the design option with the braided ramps, as shown in Table 3.1.6-23.

An auxiliary lane on the freeway mainline is included in this design option as a replacement for the braided ramps. Operation of the freeway mainline is similar with or without the braided ramps. Additional traffic details for the design option without the braided ramps and a comparison of traffic operations with and without the braided ramp design under Alternative 3 (Preferred Alternative) are provided in Appendix L5.

*No Braided Ramps Northbound at the Magnolia/Warner Interchange.* Operationally, the ramps and their volumes entering and exiting the I-405 northbound mainline under the design option with no braided ramps in the northbound direction at the Magnolia Street and Warner Avenue interchanges are the same as those with the braided ramps. The only operational difference between this design option and the braided ramp design presented in the Draft EIR/EIS is that the traffic volumes using the Warner Avenue on-ramp and the Magnolia Street off-ramp from northbound I-405 would weave across each other on a C-D road that would replace the braided ramps; if these ramps are braided there is no weaving maneuver.

Weaving analysis was conducted for the volumes weaving on the C-D road proposed in this design option. The HCS weaving analysis worksheets are presented in Appendix L6. The worksheets for year 2020 show that the weaving section is anticipated to operate at LOS B and C during the AM and PM peak hours, respectively. The worksheets for year 2040 show that the weaving section is anticipated to operate at LOS B and D during the AM and PM peak hours, respectively.

The Magnolia Street overcrossing would be widened from four to six through lanes, and a third through lane in each direction on Magnolia Street between Warner Avenue and Heil Avenue would be provided. Ramps would be widened to provide additional storage and turn lanes, and several ramps would be modified to intersect arterials at right angles to increase the distance between ramp/arterial and arterial/arterial intersections.

Beach Boulevard and Edinger Avenue Interchange. At the Beach Boulevard and Edinger Avenue interchange, the project would replace the existing cloverleaf interchange with a partial cloverleaf, eliminating the loop off-ramps and the northbound and southbound C-D roads. The remaining ramps would be modified to provide additional lanes at their arterial ends for storage and turns. A fifth lane on Beach Boulevard in each direction under the I-405 bridge would be added and would require relocating the sidewalks under the bridge behind the columns.

Goldenwest Street and Bolsa Avenue Interchange. At the Goldenwest Street and Bolsa Avenue interchange, the project would widen Bolsa Avenue in both directions and the Goldenwest Street overcrossing in each direction. Ramps would be modified to provide additional lanes at their arterial ends for turn lanes and storage. Two ramps would be modified to intersect Bolsa Avenue at right angles.

Springdale Street and Westminster Avenue Interchange. At the Springdale Street and Westminster Avenue interchange, the project would separate the two I-405 southbound off-ramps, one for Springdale Street and the other for eastbound Westminster Avenue, by removing the C-D road and providing direct off-ramps from southbound I-405. Interchange improvements would consolidate all northbound off-ramp traffic to a single ramp by widening the I-405 northbound (loop) off-ramp, accommodating left turns at the end of the ramp, and removing the existing I-405 northbound off-ramp to eastbound Westminster Avenue at Willow Lane. The left turn from westbound Westminster Avenue into the I-405 southbound on-ramp would be removed to provide turning-lane improvements at the Westminster Avenue/Springdale Street intersection. Additional lanes on the ramps at their arterial end would provide additional storage and turn lanes, and the ramp to eastbound Bolsa Avenue would be modified to a right-angle intersection.

Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange. At the Bolsa Chica Road/Valley View Street and Garden Grove Boulevard interchange, the project would widen the Bolsa Chica Road overcrossing on I-405 to provide three through lanes. The I-405 southbound off-ramp at Bolsa Chica Road would be modified to allow left turns from the ramp and provide a new access from northbound Bolsa Chica Road to the I-405 southbound on-ramp.

Seal Beach Boulevard Interchange. At the Seal Beach Boulevard interchange, the project would provide additional turn lanes at the ramp/arterial intersections and modify the Seal Beach Boulevard northbound exclusive right-turn lane onto northbound I-405 to one that would be controlled by the traffic signal. Queue storage of approximately 500 ft would be provided for this exclusive northbound right-turn lane.

### **Traffic Forecasting Model**

The traffic forecasts for the project were developed using Orange County Transportation Analysis Model (OCTAM), Version 3.3. OCTAM is a regional model that is based on the traditional four-step sequential modeling methodology. The model incorporates multimodal analytical capabilities to analyze the following modes of travel: autos, local and express bus transit, urban rail, commuter rail, toll roads, carpools, and truck traffic, as well as nonmotorized transportation, which includes pedestrian and bicycle trips. The model responds to changes in land use types, household characteristics, transportation infrastructure, and travel costs such as transit fares, parking costs, tolls, and auto operating costs.

Year 2040 future traffic volumes for the study area within Orange County were developed using projections from OCTAM. Traffic volume forecasts for year 2035 were developed first from OCTAM and then a growth factor was applied to obtain year 2040 volumes. The growth factor applied was 1 percent. Population and employment in Orange County is forecast by the Center for Demographic Research at the California State University at Fullerton to increase by approximately 1 percent from 2030 to 2035, which is the last 5-year period for which forecasts are available. A similar growth rate is assumed for the period 2035 to 2040. Year 2020 traffic forecasts were developed by adjusting the OCTAM 2035 model forecasts downward based on forecast 2020 population and employment. SCAG forecasts show that 61 percent of population and employment growth projected in Orange County is forecast to occur by 2020. Traffic growth forecasts for 2020 were adjusted down from 2040 on that basis.

A single demand forecast was prepared for the study area within Orange County. Freeway mainline forecasts for each of the alternatives utilize the same total traffic volumes on a segment but redistribute volumes among the different lane types, as necessary. Forecast AM and PM peak-hour traffic volumes on the freeway mainline and ramps are shown for each alternative for years 2020 and 2040 in Figures 3.1.6-10 through 3.1.6-17.

Because of a very small variation in projected traffic volumes during the peak hours at the freeway interchanges among the three project alternatives, it was determined that only one set of future traffic volumes would be used for analyzing the project condition on the arterials. The project condition traffic volumes were developed using the highest of the three project alternative traffic volume projections (Alternative 1, 2, or 3 condition) and are evaluated assuming the worst-case condition; however, because there are only minor variations in alternative traffic volume projections at the interchanges and on the arterials, there are no significant differences for interchange configurations using the worst-case data. Graphics showing the forecast 2020 and 2040 traffic volumes at each interchange are presented in the Traffic Study.

Traffic data and the results of operational analysis are presented below for the No Build Alternative and three build alternatives for both the freeway mainline and the interchange areas. Analysis and data are presented for both the expected Opening Year 2020 and the Design Year 2040.

### **No Build Alternative**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) No Build Alternative AM/PM peak-hour traffic volumes, along with lane schematics for the I-405 mainline and all interchange ramps within the project limits, are presented in Figures 3.1.6-10 and 3.1.6-14, respectively.

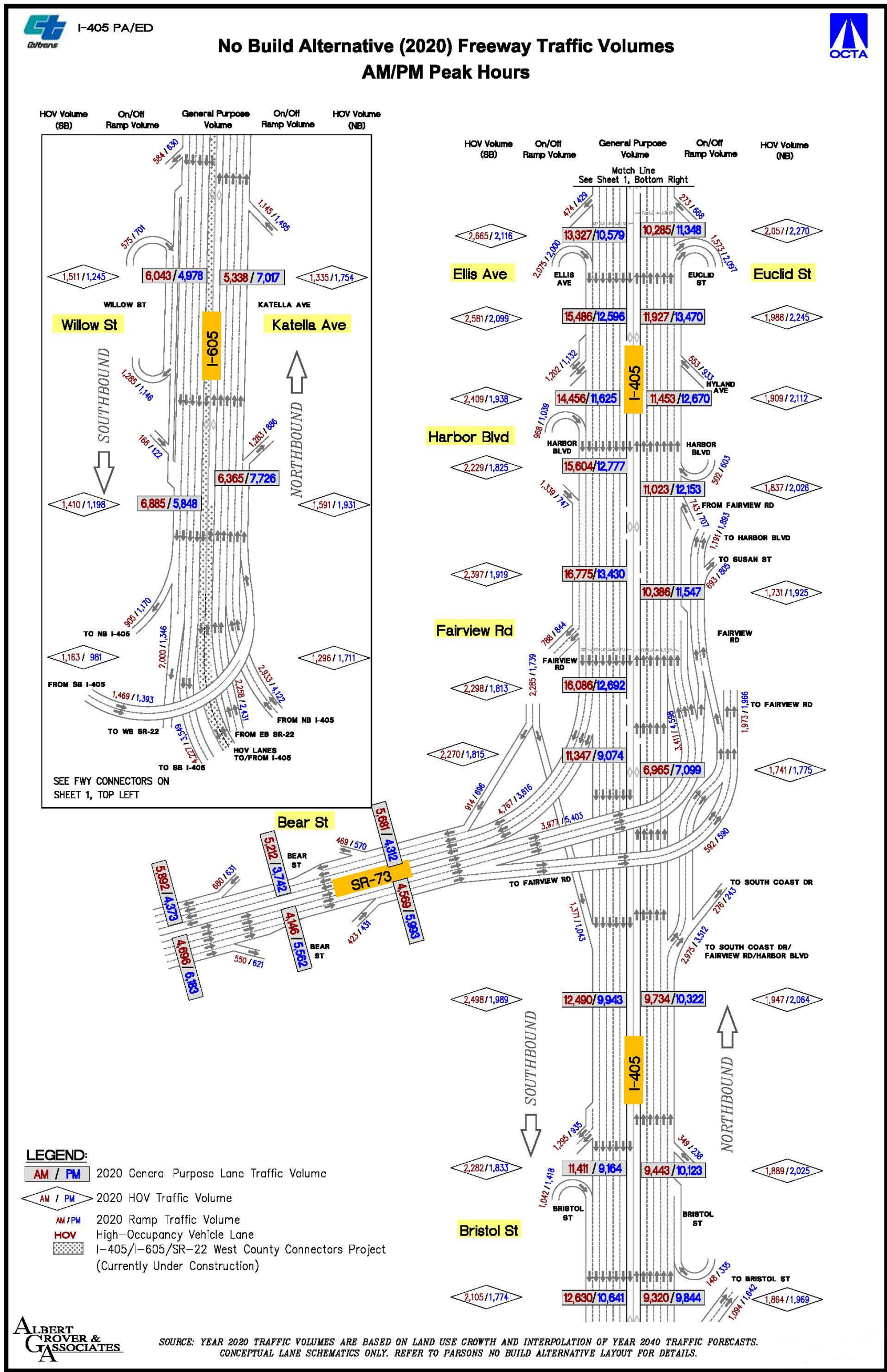
The No Build Alternative ADT along the I-405 mainline freeway in 2020 and 2040 is presented in Table 3.1.6-2. ADTs in 2020 range from **297,200 to 441,400 vpd** and from **324,000 to 489,000 vpd** in 2040, compared to the range of **257,000 to 370,000 vpd** under the existing condition. As shown in Table 3.1.6-3, no-build daily VMT in the study corridor is forecast to be **4,804,000** in 2020 and **5,299,000** in 2040, compared to **4,063,000** under the existing condition.



March 2015

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Figure 3.1.6-10: 2020 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
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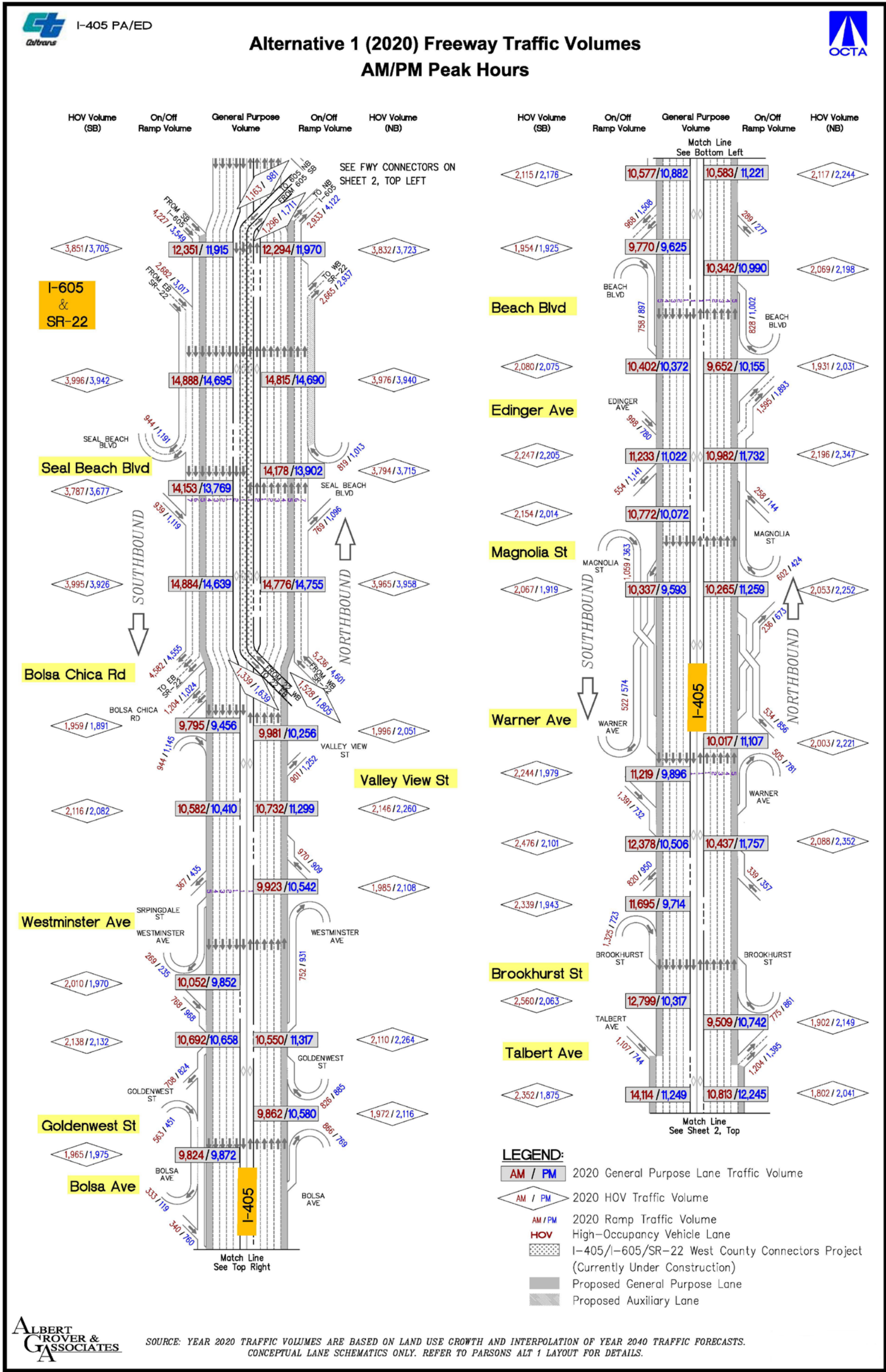


Figure 3.1.6-11: 2020 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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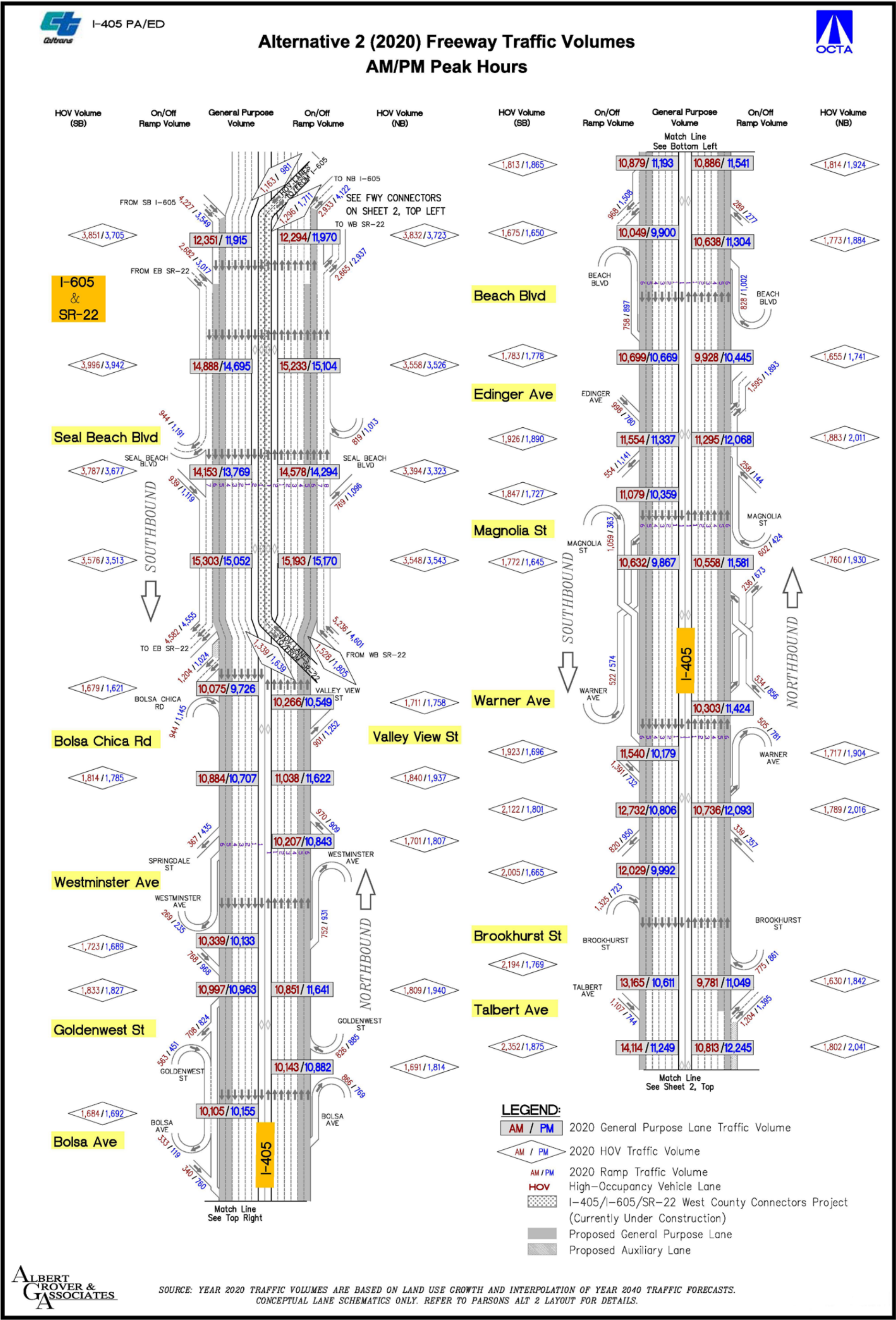


Figure 3.1.6-12: 2020 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
(page 1 of 2)

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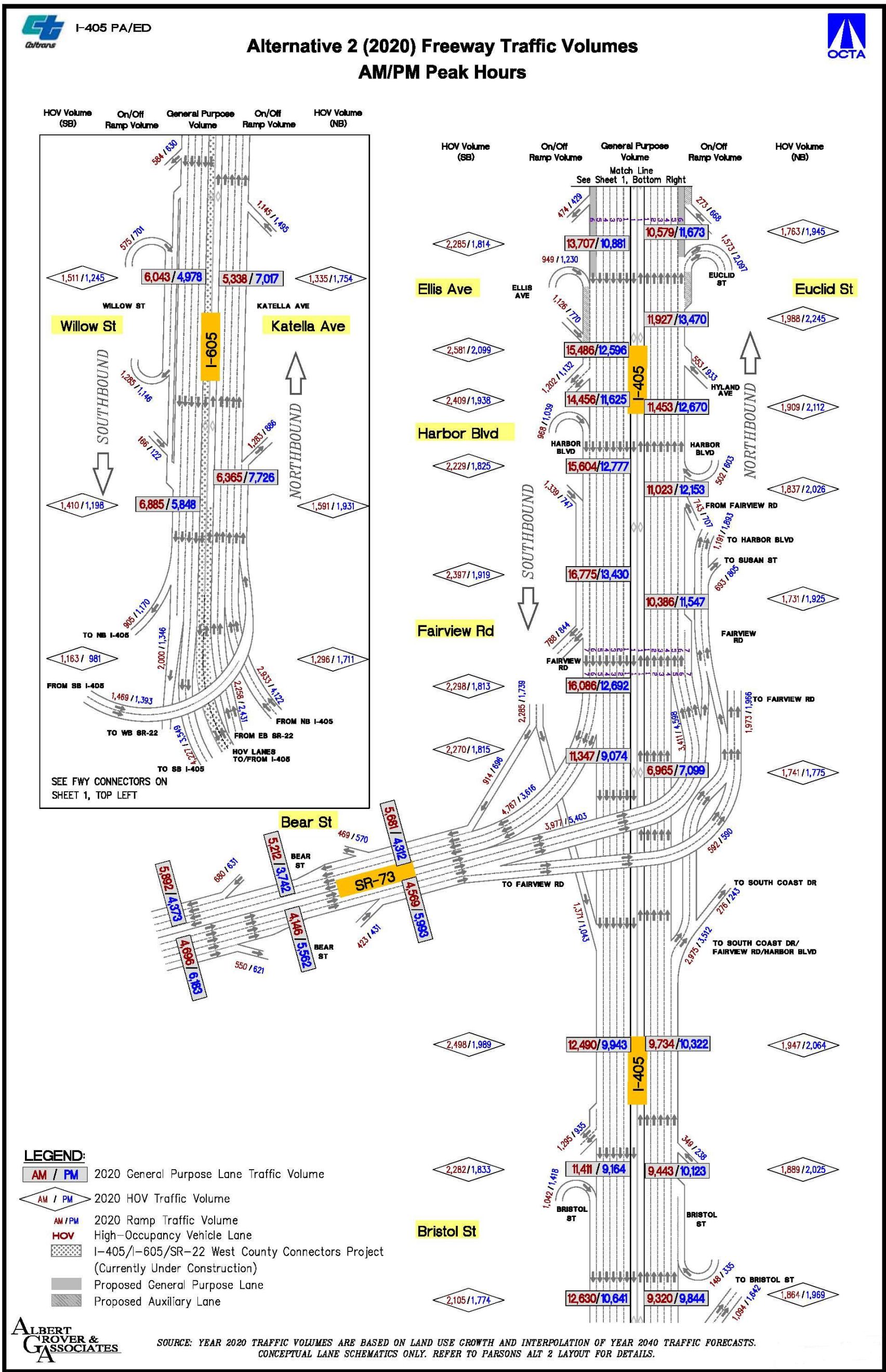


Figure 3.1.6-12: 2020 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
(page 2 of 2)

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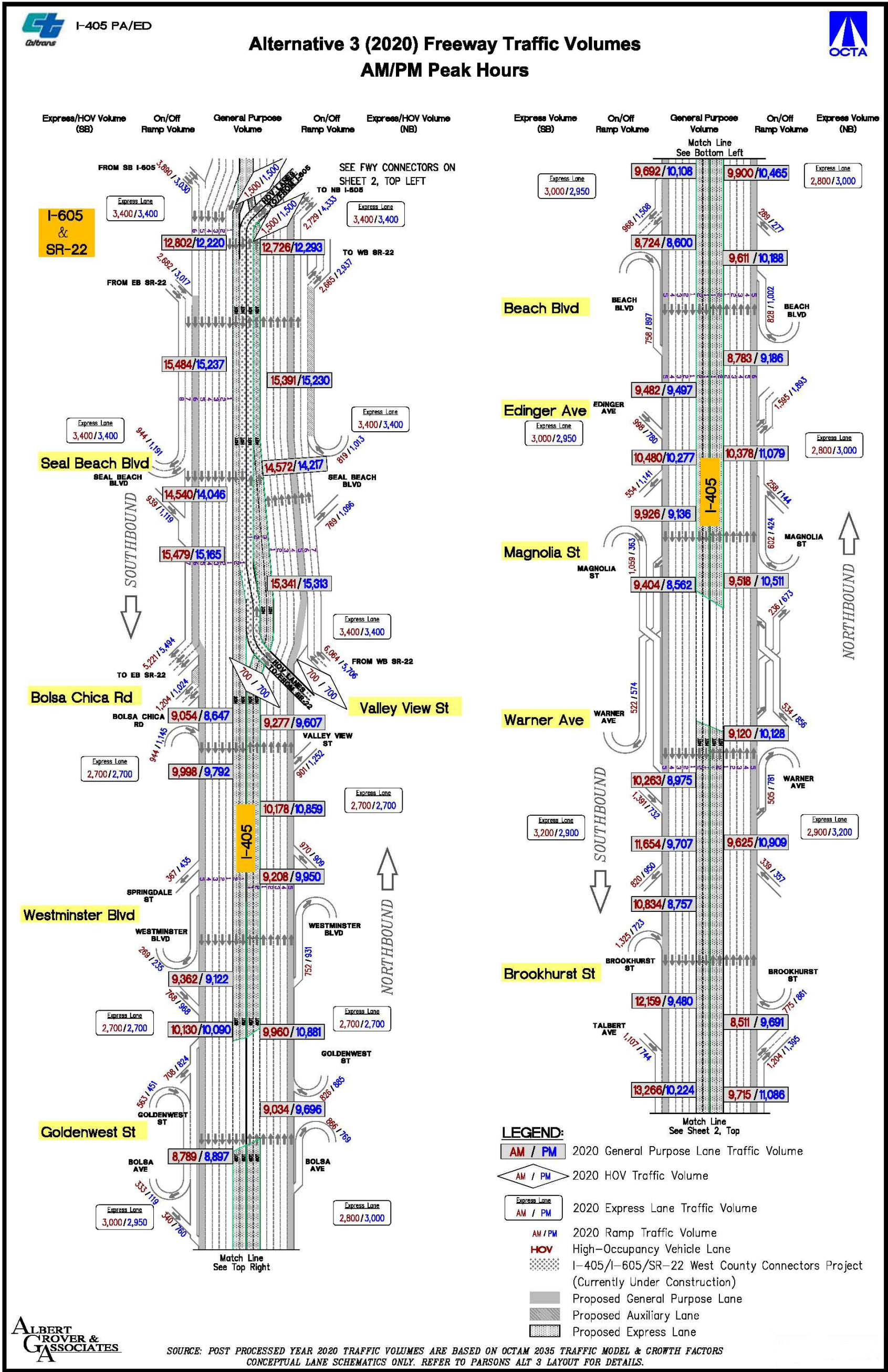


Figure 3.1.6-13: 2020 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours –  
Locations in Orange County  
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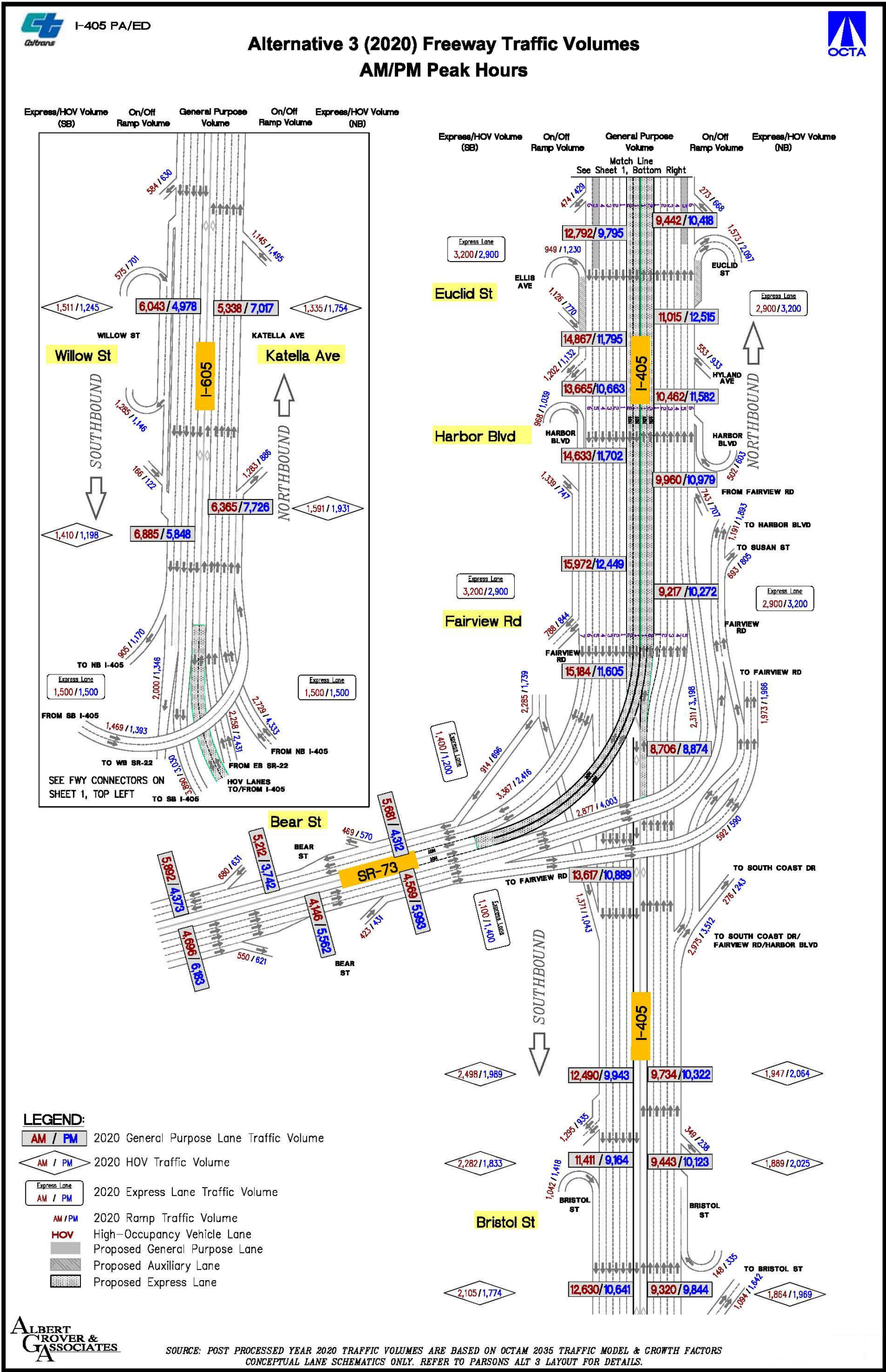


Figure 3.1.6-13: 2020 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours –  
Locations in Orange County  
(page 2 of 2)

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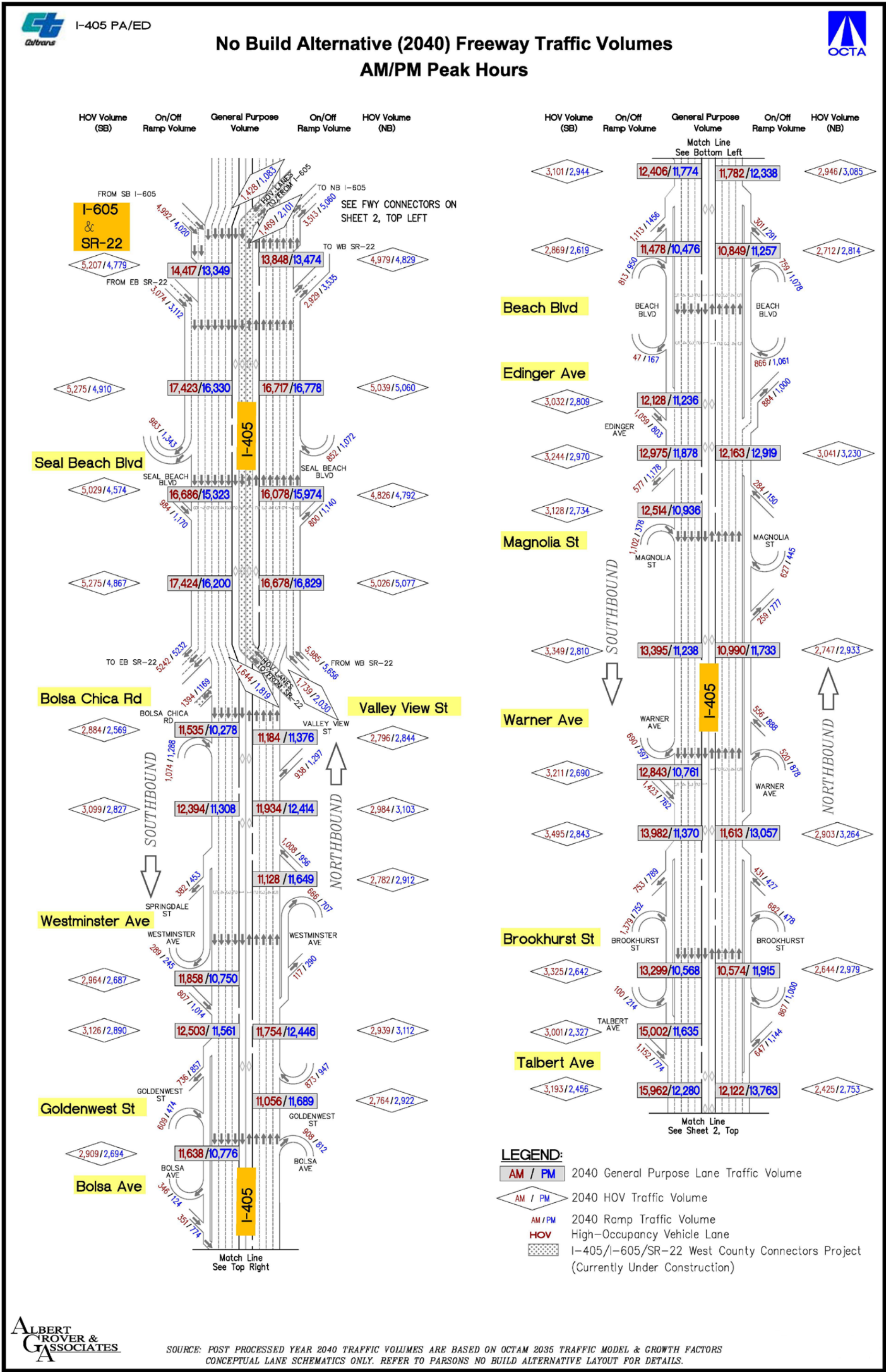


Figure 3.1.6-14: 2040 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
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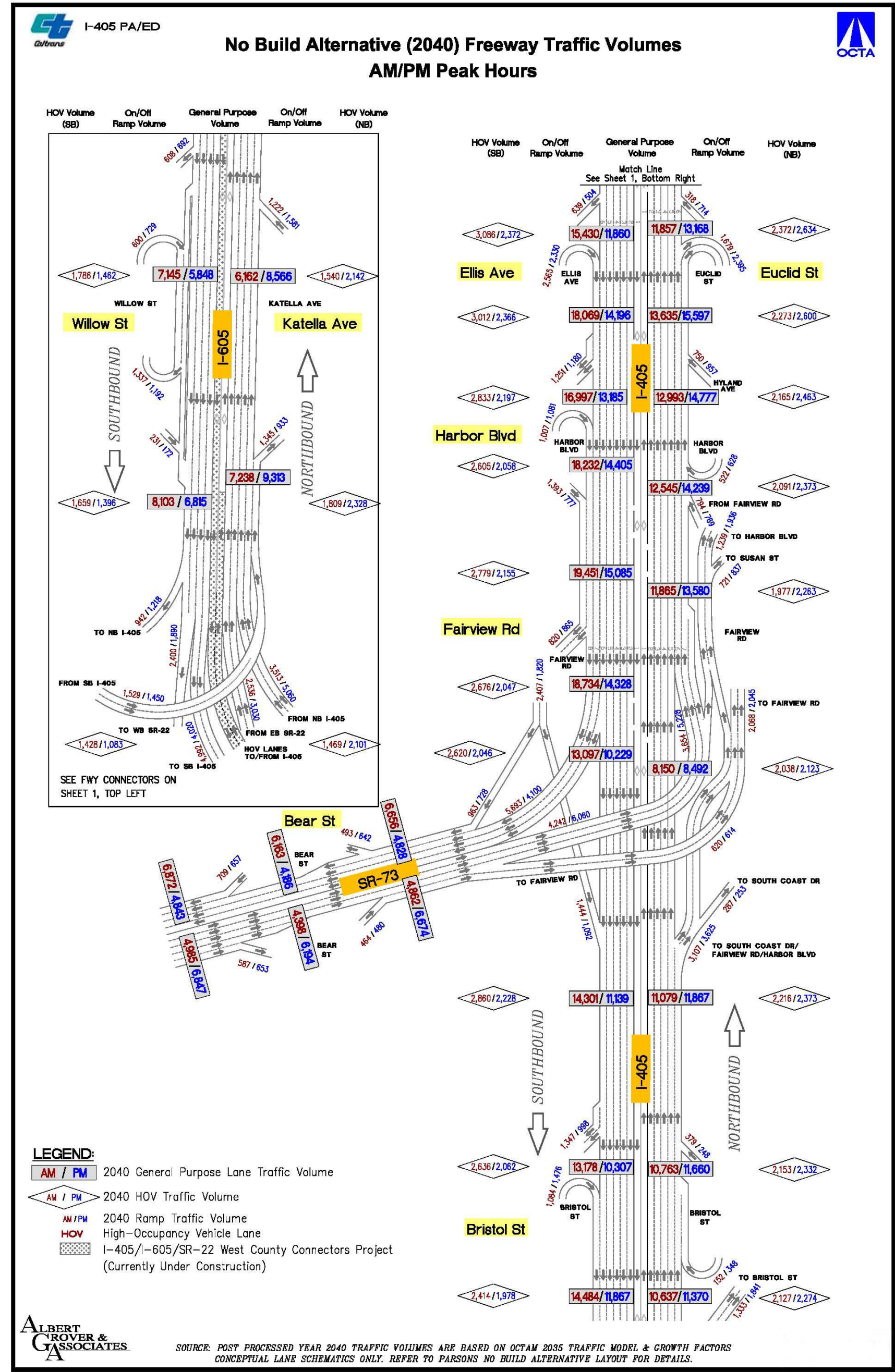
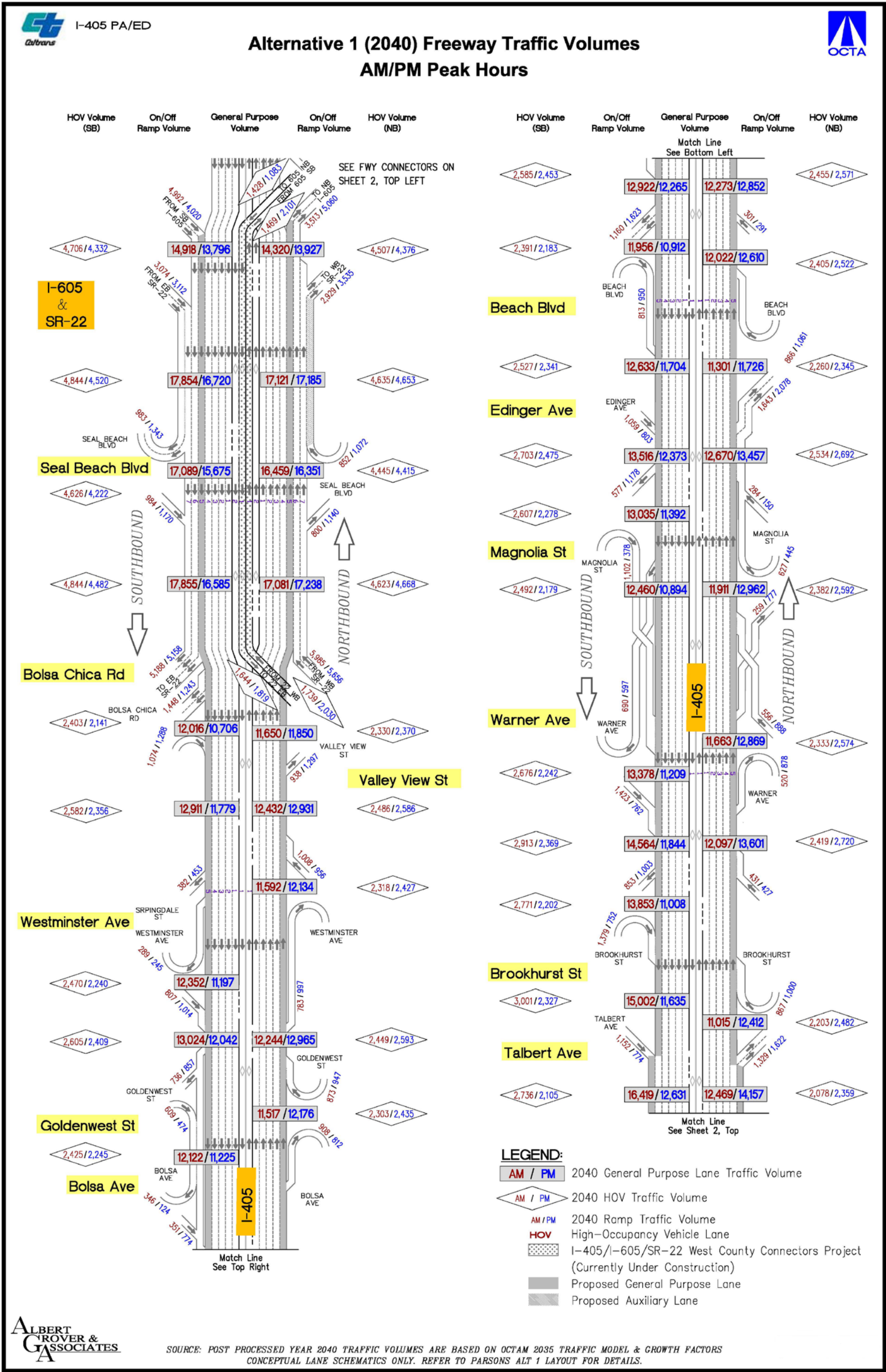


Figure 3.1.6-14: 2040 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
(page 2 of 2)

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Figure 3.1.6-15: 2040 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
(page 1 of 2)

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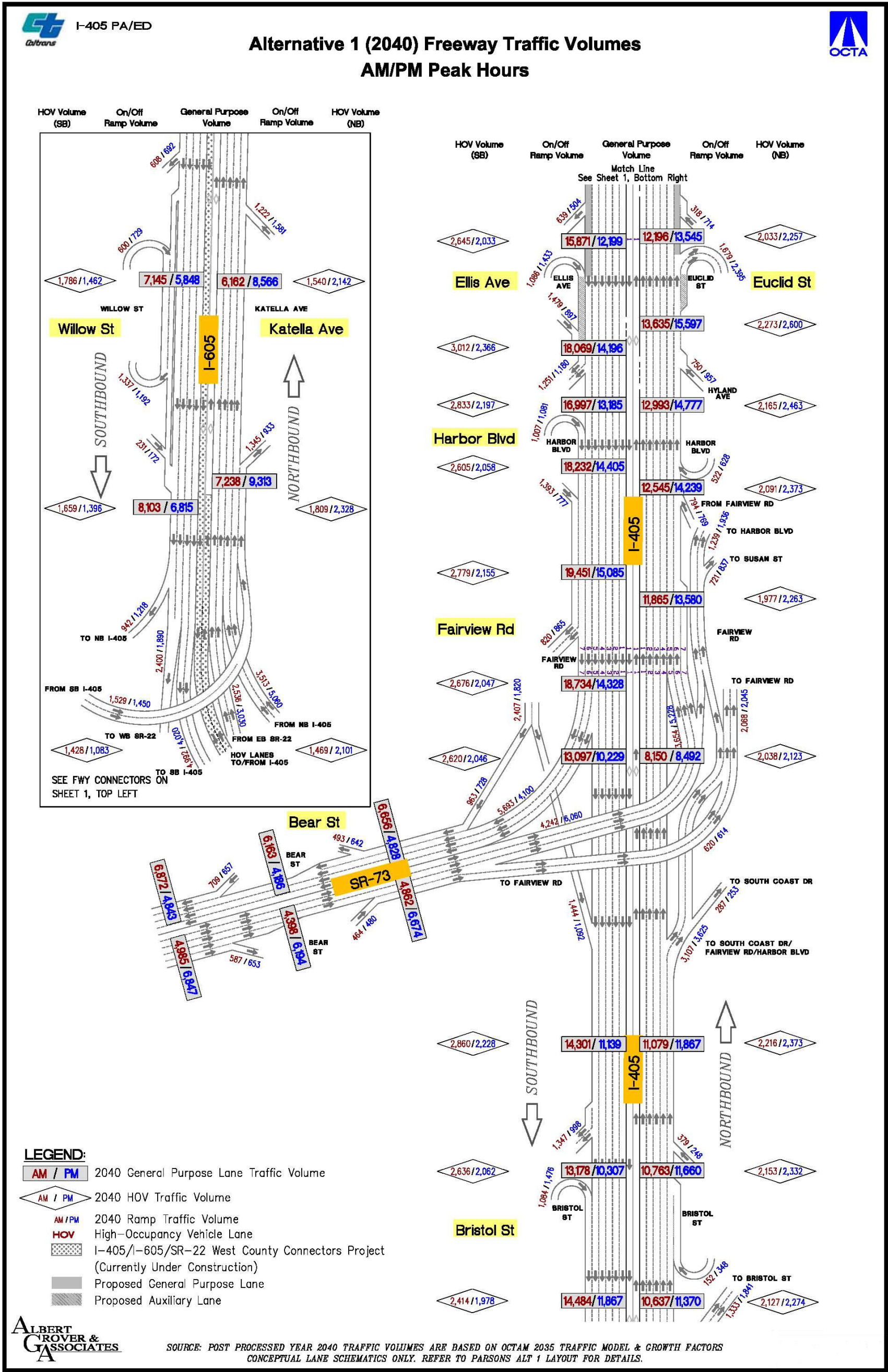
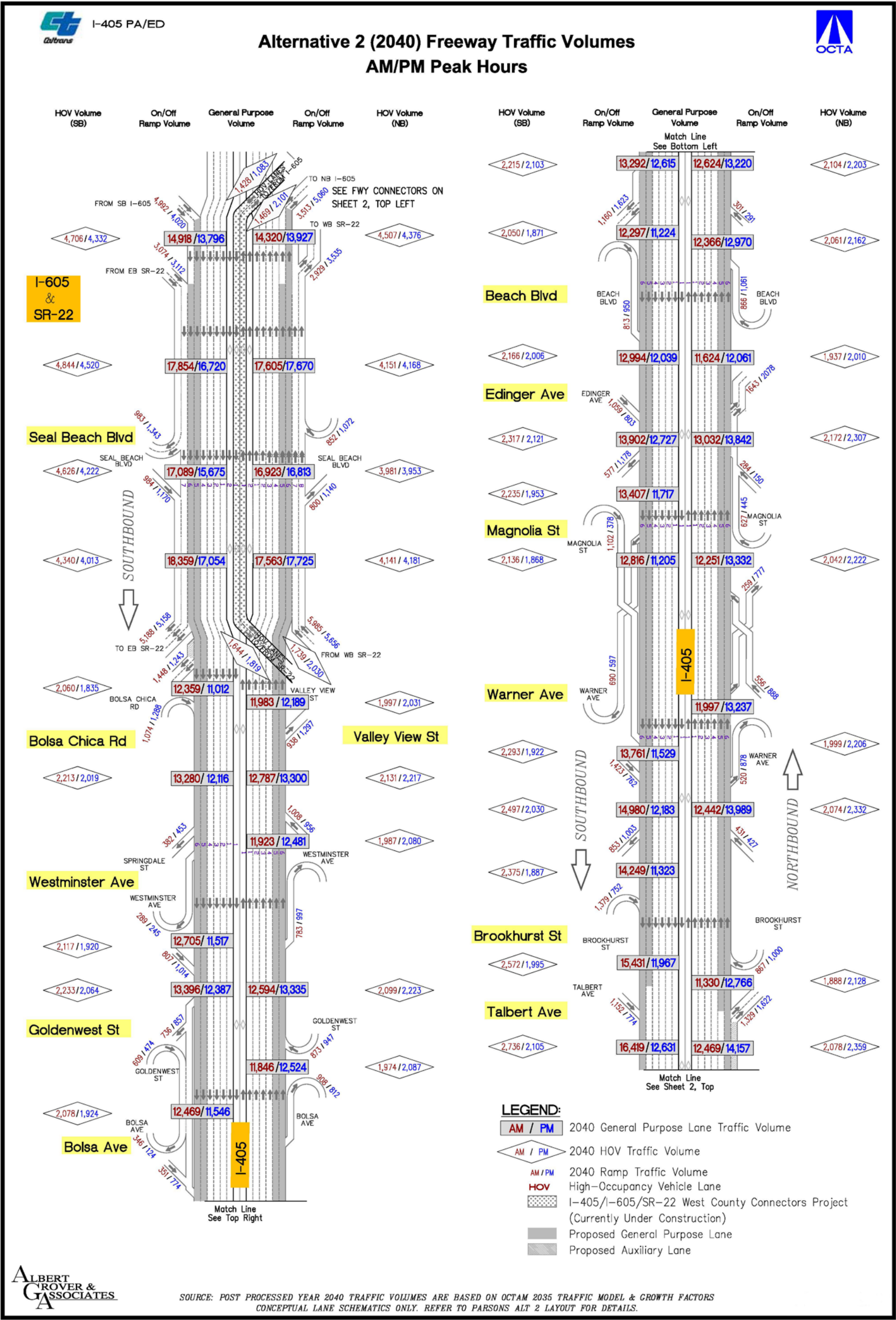


Figure 3.1.6-15: 2040 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
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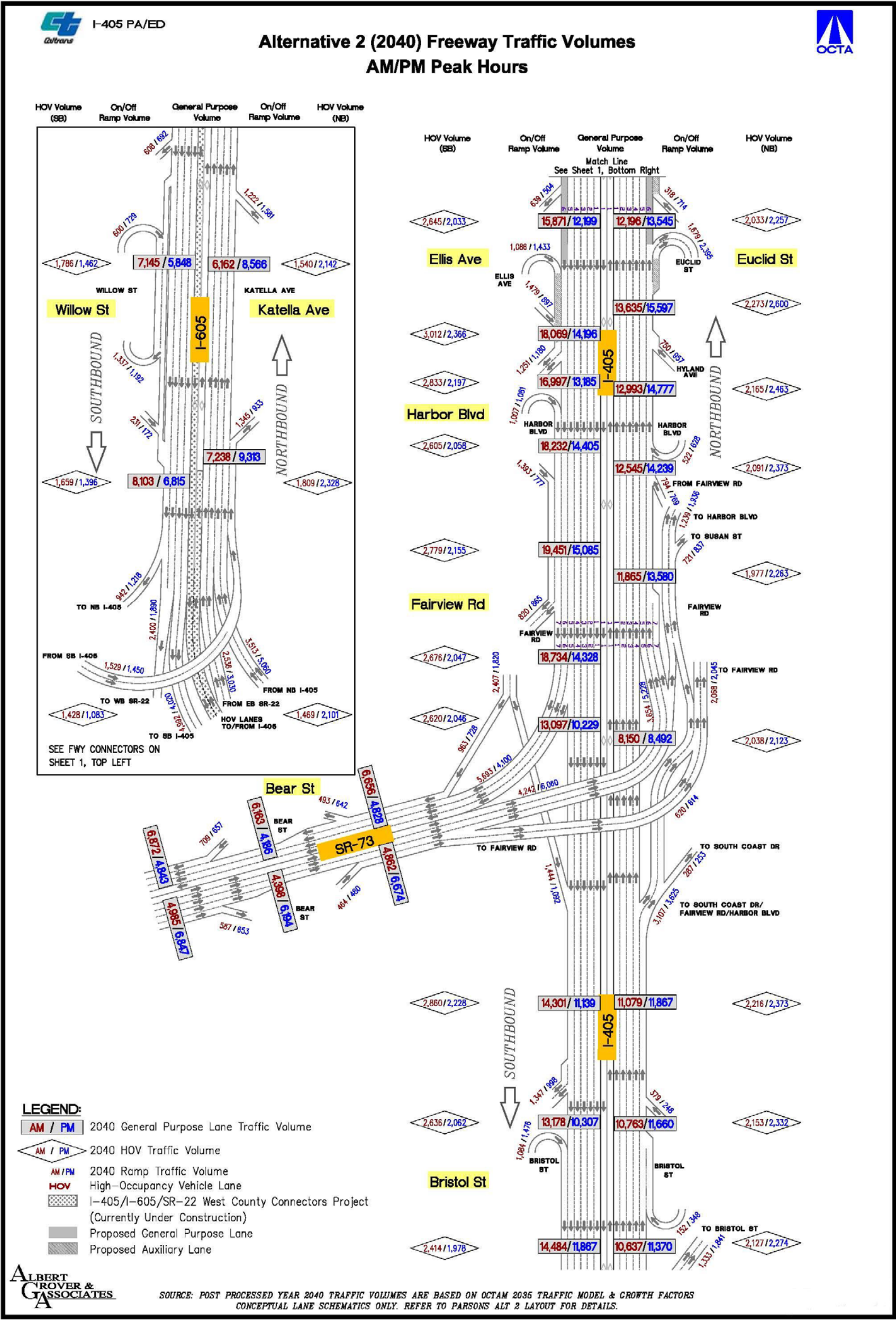


Figure 3.1.6-16: 2040 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
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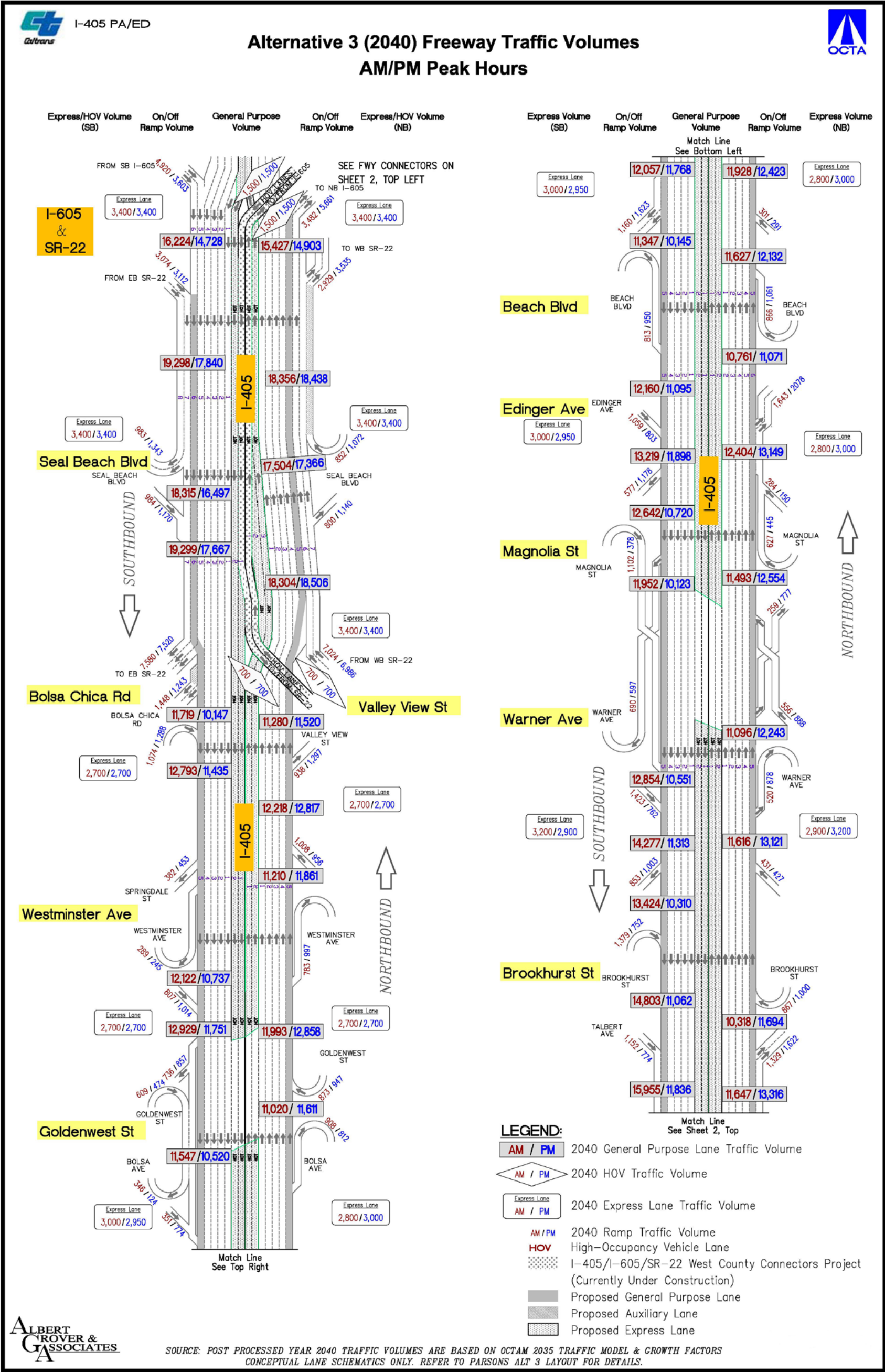


Figure 3.1.6-17: 2040 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours –  
Locations in Orange County  
(page 1 of 2)

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*V/C Ratio and LOS.* Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2020 for the GP lanes of the northbound and southbound freeway. Under no-build conditions in year 2020, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2020 under the No Build Alternative is **1.14 to 1.61** and **1.18 to 1.53** during the PM peak hour. The v/c ratios increase between 0.18 and 0.37 for the AM peak hour from the existing condition to the 2020 no-build condition and between 0.14 and 0.38 for the PM peak hour. A more-detailed link-by-link presentation of the freeway mainline LOS under the no-build traffic condition for both GP and HOV lanes is included in Appendix L1 (Table O-7).

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2020 for the HOV lanes of the northbound and southbound freeway. Under no-build conditions in year 2020, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2020 is **1.14 to 1.61** and **1.16 to 1.53** during the PM peak hour. The v/c ratios increase from 0.35 to 0.78 for the AM peak hour from the existing condition to the 2020 no-build condition and 0.15 to 0.45 for the PM peak hour.

Table 3.1.6-17 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2040 for the GP lanes of the northbound and southbound freeway. Under no-build conditions in year 2040, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2040 is **1.31 to 1.89** and **1.33 to 1.76** during the PM peak hour. The v/c ratios increase from 0.38 to 0.65 for the AM peak hour from the existing condition to the 2040 no-build condition and 0.31 to 0.61 for the PM peak hour.

Table 3.1.6-18 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2040 for the HOV lanes of the northbound and southbound freeway. Under no-build conditions in year 2040, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2040 is **1.31 to 1.89** and **1.33 to 1.76** during the PM peak hour. The v/c ratios increase from 0.56 to 1.01 for the AM peak hour from the existing condition to the 2040 no-build condition and 0.36 to 0.68 for the PM peak hour.

The HOV lanes under the no-build condition are assumed to have continuous access with no change in the HOV eligibility requirement of two persons per vehicle. Like many freeways with carpool lanes in southern California, almost all segments of carpool lanes on I-405 between SR-73 and I-605 are operating under degraded conditions (*California HOV/Express Lane*

*Business Plan*, March 31, 2009). As traffic grows over time, these conditions will degrade further; as conditions degrade, incentives such as higher travel speeds in carpool lane versus GP lanes will diminish. It is anticipated that by 2020, when the proposed I-405 improvements would be open to traffic, the travel speed incentive to use the carpool lanes on I-405 will have completely disappeared between SR-73 and SR-22 East. North of SR-22 East to I-605, there will be dual carpool lanes in each direction, and the travel speed incentive is anticipated to continue in that area for some period after 2020.

The GP and HOV lanes in the No Build Alternative are anticipated to operate at LOS F during the peak hours in 2040. This is expected to result in reduced and unstable throughput. A summary of 2040 peak-hour throughput anticipated under the No Build Alternative is presented in Table 3.1.6-19. Table 3.1.6-19 shows the number of lanes by type in each freeway study segment by direction and the throughput under the congested conditions that are anticipated. A volume of 1,200 vehicles per lane per hour (vphpl) is used for throughput for over-capacity conditions, as explained in the Traffic Study. Table 3.1.6-19 shows that the total throughput anticipated in 2040 across all lanes ranges from **6,000 to 9,600 vehicles per hour (vph)** under the no-build condition.

*Peak-Period Performance.* Table 3.1.6-6 shows forecast no-build speeds for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Forecast year 2040 speeds under the no-build condition in the GP lanes during peak hours range from **5 to 8 mph**, compared to existing condition speeds of 22 to 54 mph. Forecast year 2040 no-build speeds in the HOV lanes during peak hours range from **6 to 9 mph**, compared to existing condition speeds of 43 to 62 mph. For both lane types combined, average speeds weighted for the volumes using each lane type range from **5 to 8 mph** in 2040 under the no-build condition compared to existing condition average speeds of 28 to 56 mph.

*Corridor Travel Time.* Table 3.1.6-7 shows forecast no-build corridor travel time for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-7 also shows the average travel time across both lane types. Forecast year 2040 no-build travel time in the GP lanes during peak hours ranges from **107 to 163 minutes**, compared to 15 to 37 minutes under the existing condition. Forecast year 2040 no-build travel time in the HOV lanes during peak hours ranges from **95 to 147 minutes**, compared to 13 to 19 minutes under the existing condition. For both lane types combined, average travel time under the no-build condition in year 2040 weighted for the volumes using each lane type ranges from **105 to 160 minutes**, compared to 15 to 30 minutes under existing conditions.

Table 3.1.6-17: I-405 Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2040 – Locations in Orange County

Segment	NB or SB	Existing 2009						No Build – 2040						Alternative 1 – 2040						Alternative 2 – 2040						Alternative 3 – 2040					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C
SR-73 to Brookhurst Street	NB	27.1	D	0.89	*	F	0.93	*	F	1.31	*	F	1.49	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	41.2	F	1.17	*	F	1.35
	SB	43.9	F	1.16	29.6	D	0.95	*	F	1.73	*	F	1.33	*	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	*	F	1.61	*	F	1.23
Brookhurst Street to SR-22 East	NB	*	F	1.14	42.9	F	1.15	*	F	1.64	*	F	1.76	*	F	1.37	*	F	1.47	41.4	F	1.17	*	F	1.26	*	F	1.34	*	F	1.42
	SB	*	F	1.24	42	F	1.16	*	F	1.89	*	F	1.61	*	F	1.57	*	F	1.34	*	F	1.35	39.2	F	1.15	*	F	1.54	*	F	1.29
SR-22 East to I-605	NB	*	F	1.13	*	F	1.06	*	F	1.51	*	F	1.52	*	F	1.32	*	F	1.33	42.8	F	1.19	43.6	F	1.20	*	F	1.42	*	F	1.43
	SB	*	F	1.1	*	F	1.16	*	F	1.57	*	F	1.47	*	F	1.38	*	F	1.29	*	F	1.38	*	F	1.29	*	F	1.49	*	F	1.38

NB – Northbound; SB – Southbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; \* - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2040 than in 2009.  
Source: Albert Grover & Associates 2011.

Table 3.1.6-18: I-405 Mainline HOV/Express Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2040 – Locations in Orange County

Segment	NB or SB	Existing 2009 HOV Lane						No Build HOV Lane – 2040						Alternative 1 HOV Lane – 2040						Alternative 2 HOV Lane – 2040						Alternative 3 Express Lane – 2040					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C
SR-73 to Brookhurst Street	NB	15.6	B	0.58	46.4	F	0.93	*	F	1.31	*	F	1.49	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	22.3	C	0.78	24.6	C	0.86
	SB	27.8	D	0.81	27.8	D	0.82	*	F	1.73	*	F	1.33	*	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	24.6	C	0.86	22.3	C	0.78
Brookhurst Street to SR-22 East	NB	28.2	D	0.85	30.9	F	1.08	*	F	1.64	*	F	1.76	*	F	1.37	*	F	1.47	41.4	F	1.17	*	F	1.26	22.3	C	0.78	24.6	C	0.86
	SB	25.4	D	0.88	36	E	0.99	*	F	1.89	*	F	1.61	*	F	1.57	*	F	1.34	35.8	F	1.35	39.2	F	1.15	24.6	C	0.86	22.7	C	0.80
SR-22 East to I-605	NB	27.7	D	0.94	32.5	F	1.01	*	F	1.50	*	F	1.37	*	F	1.25	*	F	1.26	42.8	F	1.12	43.6	F	1.13	26.2	D	0.92	26.2	D	0.92
	SB	52.7	D	0.67	52.7	F	1.05	*	F	1.43	*	F	1.41	*	F	1.31	*	F	1.22	*	F	1.31	*	F	1.22	26.2	D	0.92	26.2	D	0.92

NB – Northbound; SB – Southbound; HOV – High-Occupancy Vehicle; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; \* - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2040 than in 2009.  
Source: Albert Grover & Associates 2011.

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